

Patent
Attorney Docket: LYNN/0083

REMARKS

Claims 1-40, 43-53 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the Bouzek article applied as of record in view of U.S. Patent No. 5,217,584 issued to Deininger. As the Examiner has determined, the Bouzek article does not disclose that the aqueous hydroxide solution comprises a mixture of at least two hydroxides as it uses either sodium or potassium hydroxide. (Office Action, p. 2, ¶ 3). The Examiner further determined that Bouzek does not disclose the use of an alkaline earth metal hydroxide as well as the concentration of the mixture of the hydroxides, electrode and the superimposed current over the DC current. (*Id.* at ¶ 4).

Deininger discloses a *chemical* method and apparatus for the production of ferrates. Deininger discloses that the process *requires* that a chlorinated caustic solution which contains a strong alkali metal *or* alkaline earth metal hydroxide, preferably potassium hydroxide, be present in the oxidizing reactor in order to produce the alkali metal or alkaline earth metal ferrate product. (Deininger, col. 5, lines 3-15). Deininger further discloses that the alkali metal or alkaline earth metal hydroxide, aside from being a reactant, controls the precipitation and crystallization of the ferrate product in the reactor. *Id.*

Applicant claims *electrochemical* methods that comprise, *inter alia*, providing an aqueous hydroxide solution in fluid communication between an anode and a cathode, wherein the aqueous hydroxide solution comprises a mixture of at least two hydroxides. (Independent claims 1, 30 and 53).

The *chemical* method disclosed by Deininger is an entirely different process than the *electrochemical* method claimed by Applicant. The reactions that take place are not similar. For example, Deininger discloses the reaction for the disclosed process as requiring a hypohalite and reacting beta ferric oxide to form the ferrate. (Deininger, col. 4, lines 24-40). Deininger also discloses that ferrous ions, nickel and molybdenum are harmful metallic impurities. *Id.* Applicant claims an electrochemical method that includes a sacrificial iron containing anode, which would be harmful impurity in the method disclosed by Deininger. (Claims 1, 53).

As discussed in the remarks above, Deininger *requires* that a chlorinated caustic solution

Patent
Attorney Docket: LYNN/0083

which contains a strong alkali metal *or* alkaline earth metal hydroxide. Deininger does not teach or suggest that a combination of these hydroxides may be utilized – rather Deininger *requires* that one *or* the other be used.

To establish a *prima facie* case of obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 985 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art. *In re Wilson*, 424 F.2d 1382, 1385 (CCPA 1970).

An additional requirement for providing a *prima facie* case of obviousness is that the Examiner must provide a basis for combining or modifying the cited references. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680 (Fed. Cir. 1990).

Applicant respectfully asserts that a *prima facie* case of obviousness has not been presented because the cited prior art, either alone or in combination, do not disclose the limitation claimed by Applicant of two or more hydroxides. The Examiner has determined that Bouzek does not disclose the use of two or more hydroxides. A careful reading of the prior art reference cited to support using two or more hydroxides – Deininger – shows that Deininger *requires* that either a strong alkali metal *or* alkaline earth metal hydroxide be used. Deininger does not disclose, suggest or teach the use of a combination of hydroxides.

Therefore, because the prior art references cited by the Examiner do not suggest, teach or otherwise disclose the use of two or more hydroxides, a *prima facie* case of obviousness has not been presented. Reconsideration and withdrawal of the rejection of independent claims 1, 30 and 53 is respectfully requested as well as the rejection for all claims depending therefrom.

The Examiner has further determined that it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the two known compositions of hydroxides unless such combination provides unexpected results. (Office Action, p. 2, ¶ 5). Although Applicant does not believe that the two prior art references can be combined because one refers to an electrochemical process and the other a chemical process that requires the use of only

Patent

Attorney Docket: LYNN/0083

one hydroxide at a time as discussed in the remarks above, Applicant respectfully points out the unexpected results that may be obtained by combining the hydroxides. Such unexpected results are found in FIGS. 6A-6C. FIGS. 6A-6B provide data of ferrate production using only NaOH (FIG. 6A) and only KOH (FIG. 6B). Comparing these results to the results shown in FIG. 6C show the unexpected results of using two hydroxides in combination resulting in a synergistic effect. As disclosed in the specification, FIG. 6C shows that ferrate concentration increased linearly throughout the process at a rate of approximate 1/3 mM per minute and further experiments indicated that this linear production rate held constant for long periods of time providing an average ferrate production rate of 0.34 mM/min. (Specification, p. 20, Example 4). This is a surprising result compared to the production rate shown in FIGS. 6A-6B, which were 0.18 mM/min and 0.03 mM/min respectfully. (Specification, p. 19, Examples 1 and 2).

Therefore, unexpected results are obtained by combining two or more hydroxides in the claimed invention. Reconsideration and withdrawal of the rejection of independent claims 1, 30 and 53 is respectfully requested as well as for those claims that depend therefrom.

The cited prior art references do not address the same method of making a ferrate and therefore, there is no motivation or suggestion to combine the teachings of one with the teachings of the other. The chemical reactions that take place are different. The disclosure of Deininger states that iron would be a harmful metallic impurity and Applicant, as well as Bouzek disclose an iron anode. Deininger requires a hypohalite for the reaction to proceed. The effects of hydroxides in the different reactions are not shown to be the same. Most importantly, Deininger requires that only one hydroxide be used at a time. Therefore, Applicant respectfully asserts that a *prima facie* case of obviousness has not been provided since the Examiner has not offered evidence of the suggestion, teaching or motivation to combine the cited prior art references. Reconsideration and withdrawal of the rejection of independent claims 1, 30 and 53 is respectfully requested as well as all claimed depending therefrom.

Applicant respectfully requests that the Examiner provide evidence to support the assertion

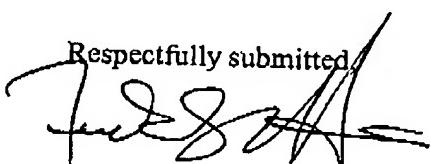
Patent
Attorney Docket: LYNN/0083

that it is well known in the art to superimpose a sinusoidal current over DC and thus would have been an obvious modification because such superimposition is routinely used in the art to provide increased current and thus an increased product. (Office Action, bridging paragraph between p. 2 and p. 3). Such request is made pursuant to MPEP § 2144.03 that puts a burden upon Applicant to reasonably traverse the well known statement during examination or submit to the statement as being admitted prior art. Applicant hereby traverses the statement of the Examiner that such imposition is routinely used in the art to provide increased current and thus an increased product.

Having addressed all claim rejections made in the Final Office Action dated January 12, 2005, Applicant respectfully asserts that all claims are now in condition for allowance and requests that a Notice of Allowance be timely issued. If the Examiner believes that a telephone interview would expedite the examination of this pending application, the Examiner is invited to call the undersigned attorney at the convenience of the Examiner.

In the event there are additional charges in connection with the filing of this Response, the Commissioner is hereby authorized to charge the Deposit Account No. 50-0714/LYNN/0083 of the firm of the below-signed attorney in the amount of any necessary fee.

Respectfully submitted,



Frank J. Campigotto
Attorney for Applicant
Registration No. 48,130
STREETS & STEELE
13831 Northwest Freeway, Suite 355
Houston, Texas 77040
(713) 939-9444
Customer No. 24945